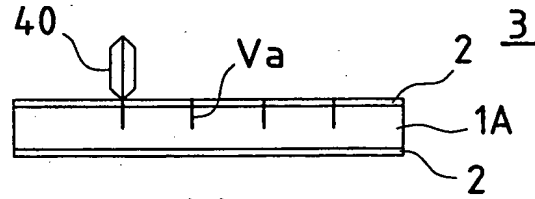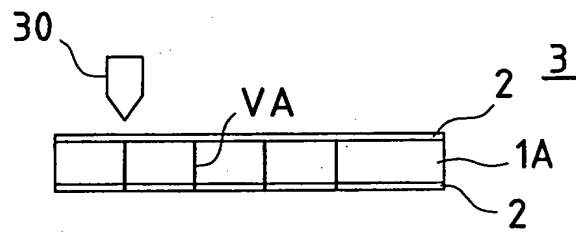FIG.1

(a)

(b)

(c)

(d)

(e)

FIG.2

(a)

P1	: PROTECTIVE MATERIAL PROCESSING DEVICE (201)
R1~R4	: TRANSPORT ROBOTS
S1	: SCRIBING DEVICE (202)
B1	: BREAKING DEVICE (203)
E1	: SEPARATING DEVICE (205)
C1	: PROTECTIVE MATERIAL CUTTING DEVICE (204)

201 202 203 204 205

P1   S1   B1   C1   E1   (r)

(R1)   (R2)   (R3)   (R4)

(b)

201

P1

202

(R1)

S1

203

B1

(r)

E1 (R4) C1   R

205   204

FIG.3

(a)

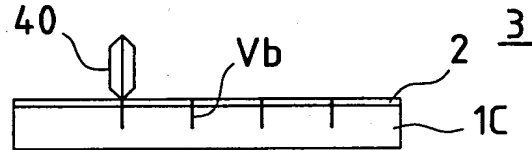(b)

(c)

(d)
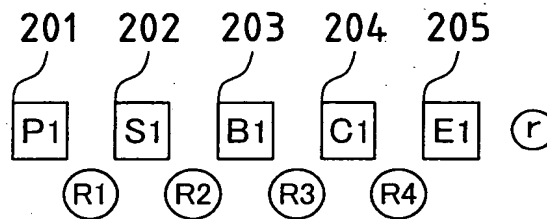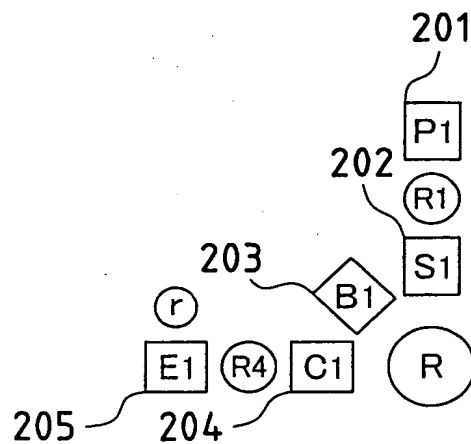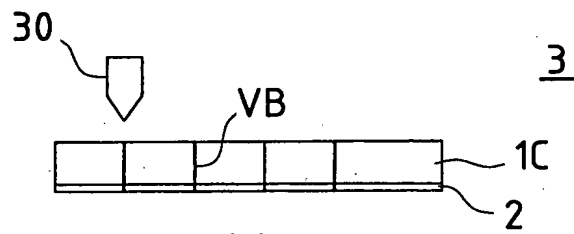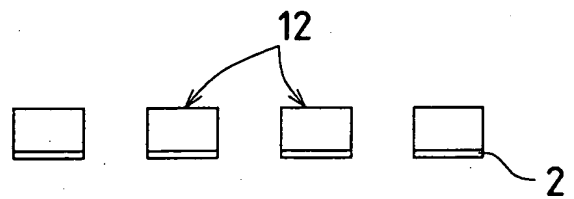
FIG.4

(a)

P1	: PROTECTIVE MATERIAL PROCESSING DEVICE (221)
R1～R3	: TRANSPORT ROBOTS
S1	: SCRIBING DEVICE (222)
B1	: BREAKING DEVICE (223)
E1	: SEPARATING DEVICE (224)

221 222 223 224

P1 S1 B1 E1 r

R1 R2 R3

(b)

221

P1

R1

224 — E1   r   222

R3   S1

223 — B1

R

FIG.5

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)
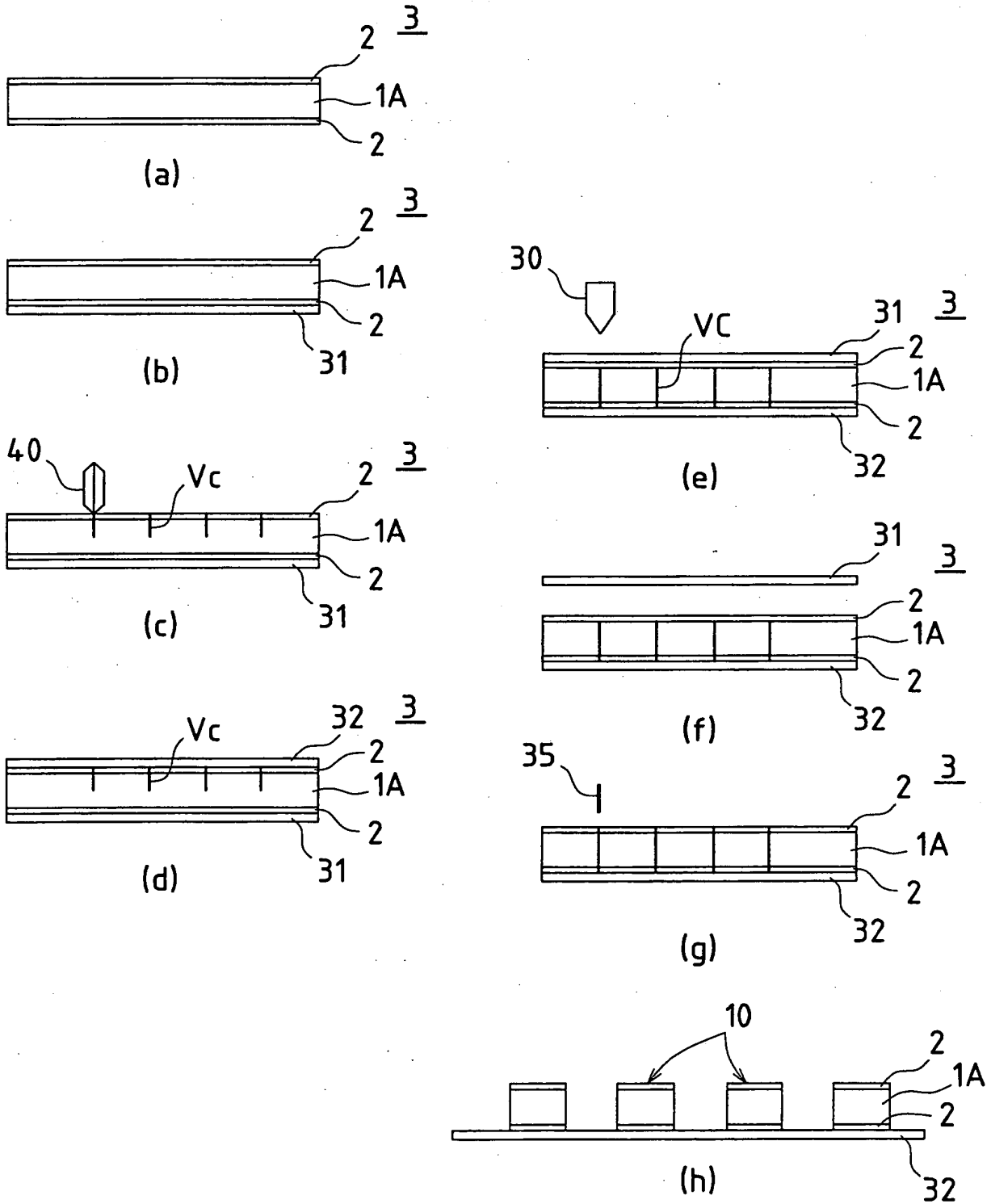
FIG.6

(a)

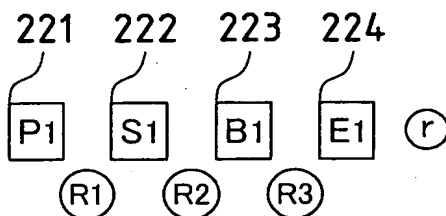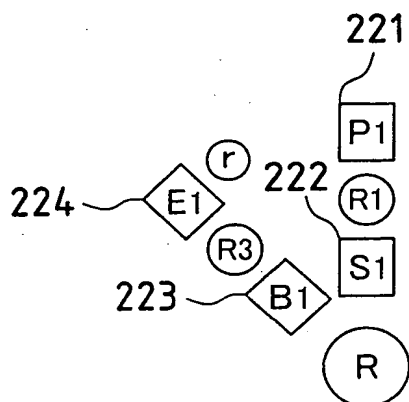|		
P1	:	PROTECTIVE MATERIAL PROCESSING DEVICE (261)
R1～R7	:	TRANSPORT ROBOTS
F1～F3	:	FILM PROCESSING DEVICES (262, 264, 266)
S1	:	SCRIBING DEVICE (263)
B1	:	BREAKING DEVICE (265)
E1	:	SEPARATING DEVICE (268)
C1	:	PROTECTIVE MATERIAL CUTTING DEVICE (267)

261 262 263 264 265 266 267 268

P1 F1 S1 F2 B1 F3 C1 E1 (r)

(R1) (R2) (R3) (R4) (R5) (R6) (R7)

(b)

261
P1
262
(R1)
F1
263
S1
F2
R
264
B1
C1 — 267
F3
(R7) (r)
265
266
E1 — 268

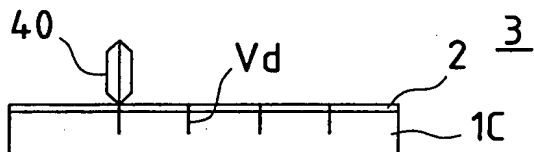FIG.7

(a)

(b)

(c)

(d)

(e)
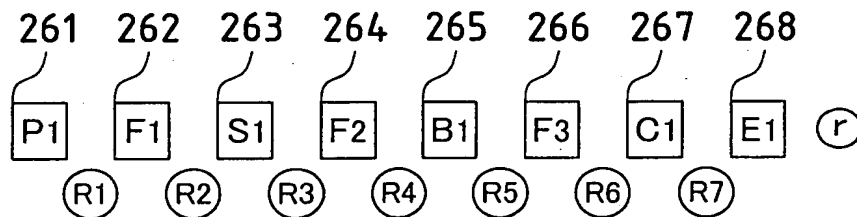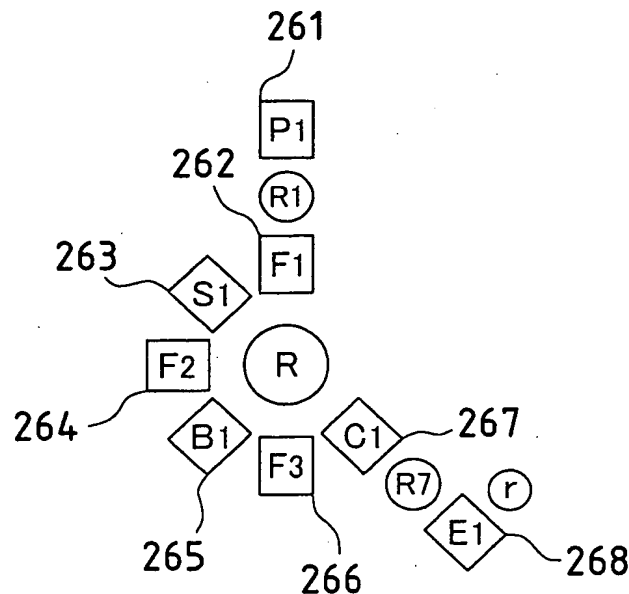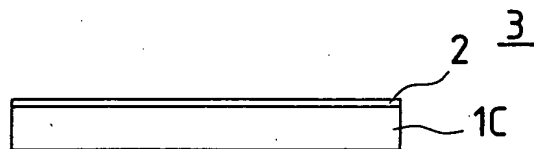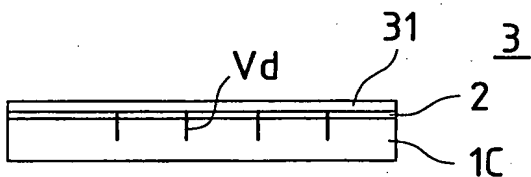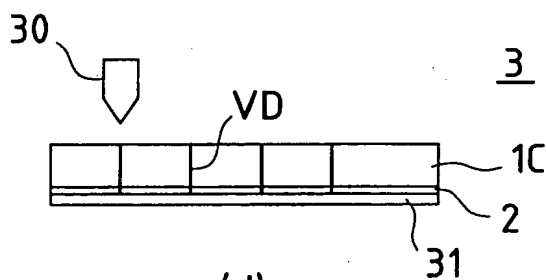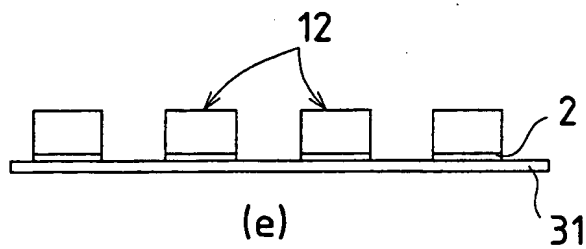
FIG.8

(a)

P1	: PROTECTIVE MATERIAL PROCESSING DEVICE (281)
R1~R4	: TRANSPORT ROBOTS
F1	: FILM PROCESSING DEVICE (283)
S1	: SCRIBING DEVICE (282)
B1	: BREAKING DEVICE (284)
E1	: SEPARATING DEVICE (285)

281 282 283 284 285

P1 S1 F1 B1 E1 (r)

(R1) (R2) (R3) (R4)

(b)

281

P1

282

(R1)

S1

283

(r) F1

E1 (R4) B1 R

285 284

FIG.9

1

2
1A
1B
2

(a)

40   Ve   1
                2
                1A
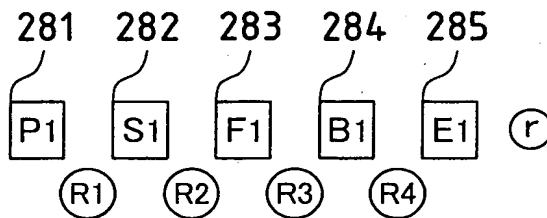   1B
                2

(b)

30   VE   1
                2
                1B
                1A
                2

(c)

40   Vf   1
                2
                1B
                1A
                2

(d)

30   VF   1
                2
                1A
                1B
                2

(e)

13   2

2

(f)
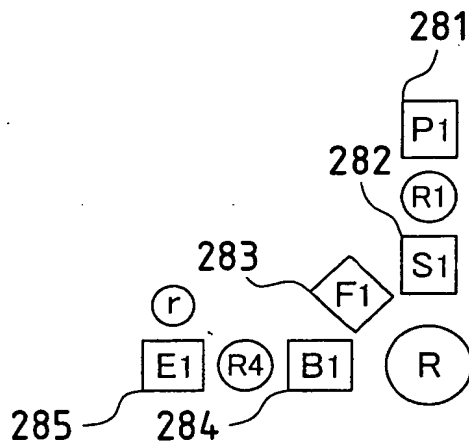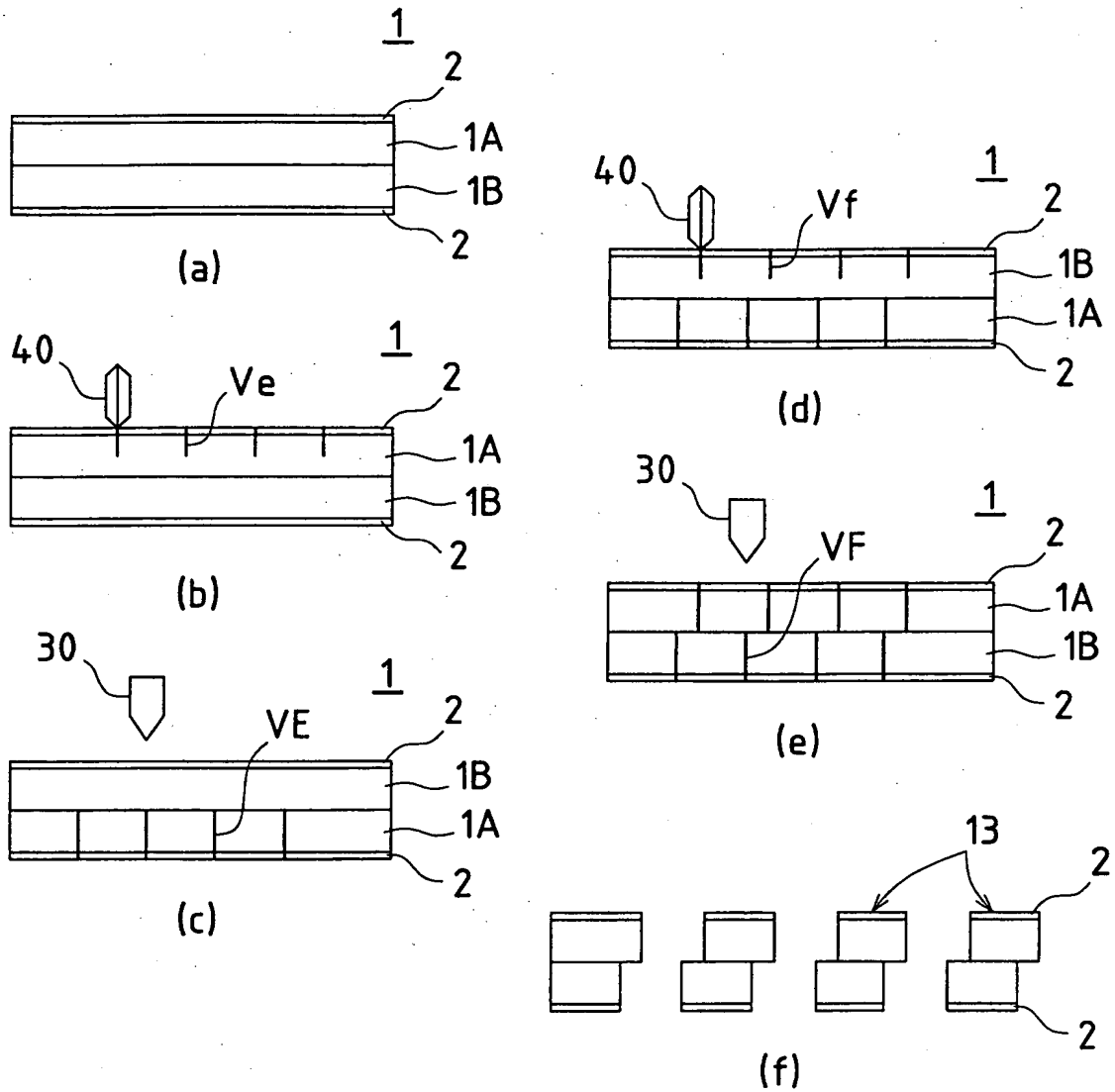
FIG.10

(a)

P1	:	PROTECTIVE MATERIAL PROCESSING DEVICE (301)
R1~R5	:	TRANSPORT ROBOTS
S1·S2	:	SCRIBING DEVICES (302, 304)
B1·B2	:	BREAKING DEVICES (303, 305)
E1	:	SEPARATING DEVICE (306)

301 302 303 304 305 306

P1 S1 B1 S2 B2 E1 ⓡ

Ⓡ1 Ⓡ2 Ⓡ3 Ⓡ4 Ⓡ5

(b)

301

P1

302

Ⓡ1

S1

303

B1

304 S2   R

B2

ⓡ Ⓡ5   305

E1

306

FIG.11

1

(a)

1C
1A
2

(b)

40
Vg

1

1C
1A
2

(c)

30
VG

1

2
1A
1C

(d)

40
Vh

1

2
1A
1C

(e)

30
VH

1

1C
1A
2

(f)

14

1C
1A
2
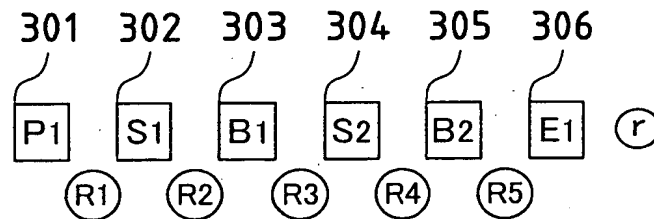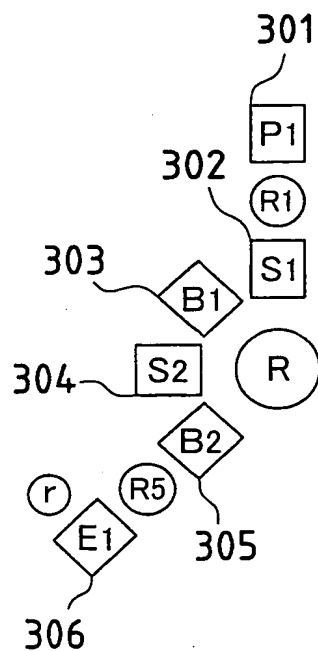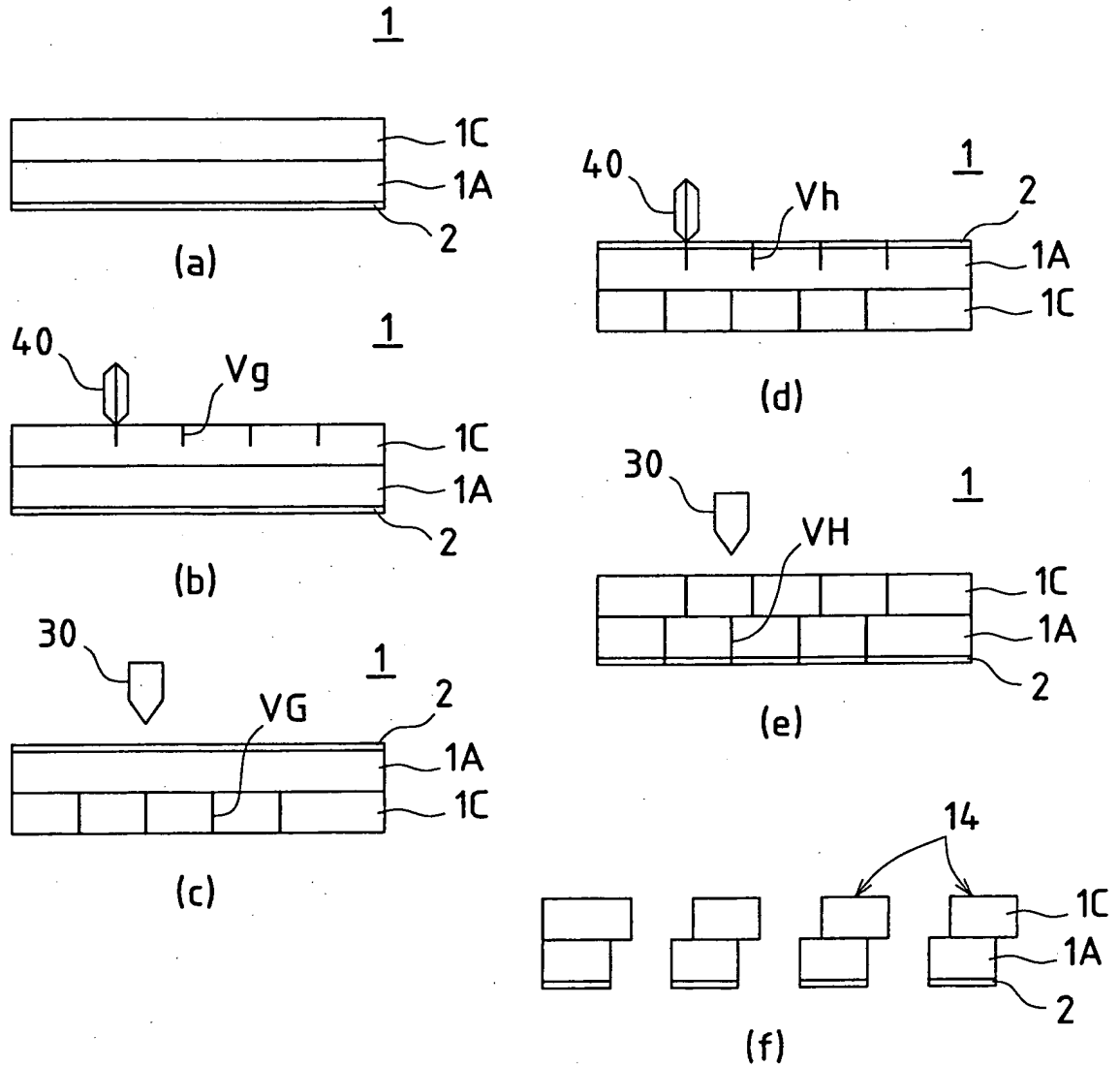
FIG.12

(a)

P1	:	PROTECTIVE MATERIAL PROCESSING DEVICE (321)
R1～R5	:	TRANSPORT ROBOTS
S1・S2	:	SCRIBING DEVICES (322, 324)
B1・B2	:	BREAKING DEVICES (323, 325)
E1	:	SEPARATING DEVICE (326)

321 322 323 324 325 326

P1   S1   B1   S2   B2   E1   (r)

(R1) (R2) (R3) (R4) (R5)

(b)

321
P1
322
(R1)
S1
323
B1
324 S2   (R)
B2
(r) (R5)
E1
325
326

FIG.13

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

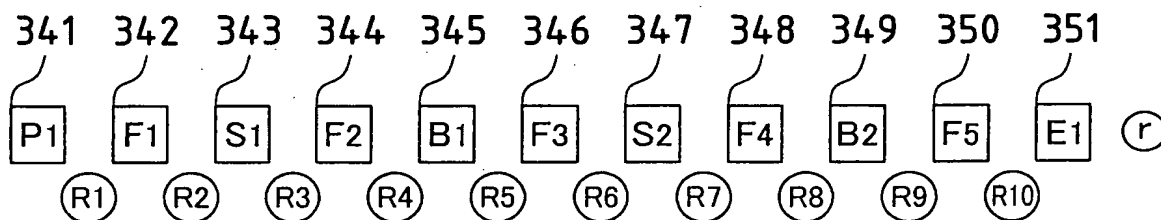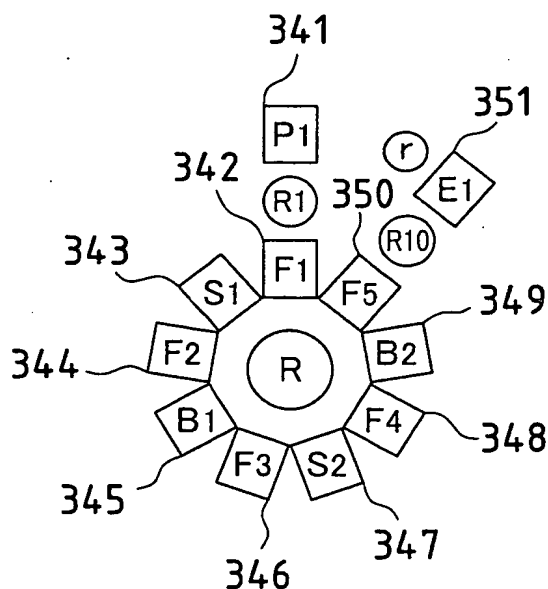(i)

(j)
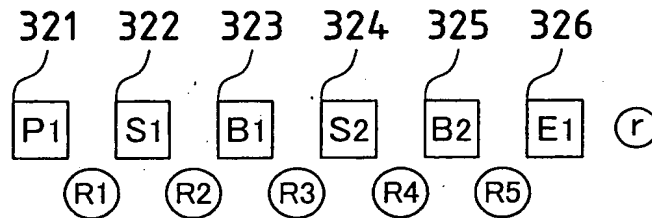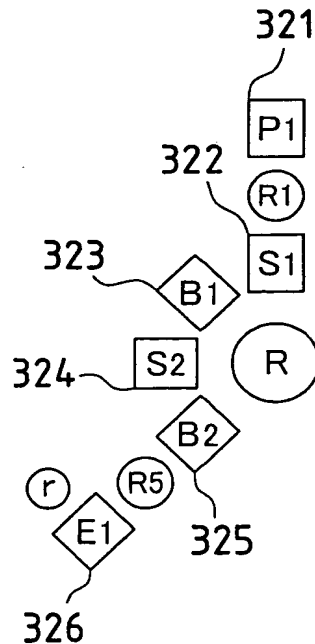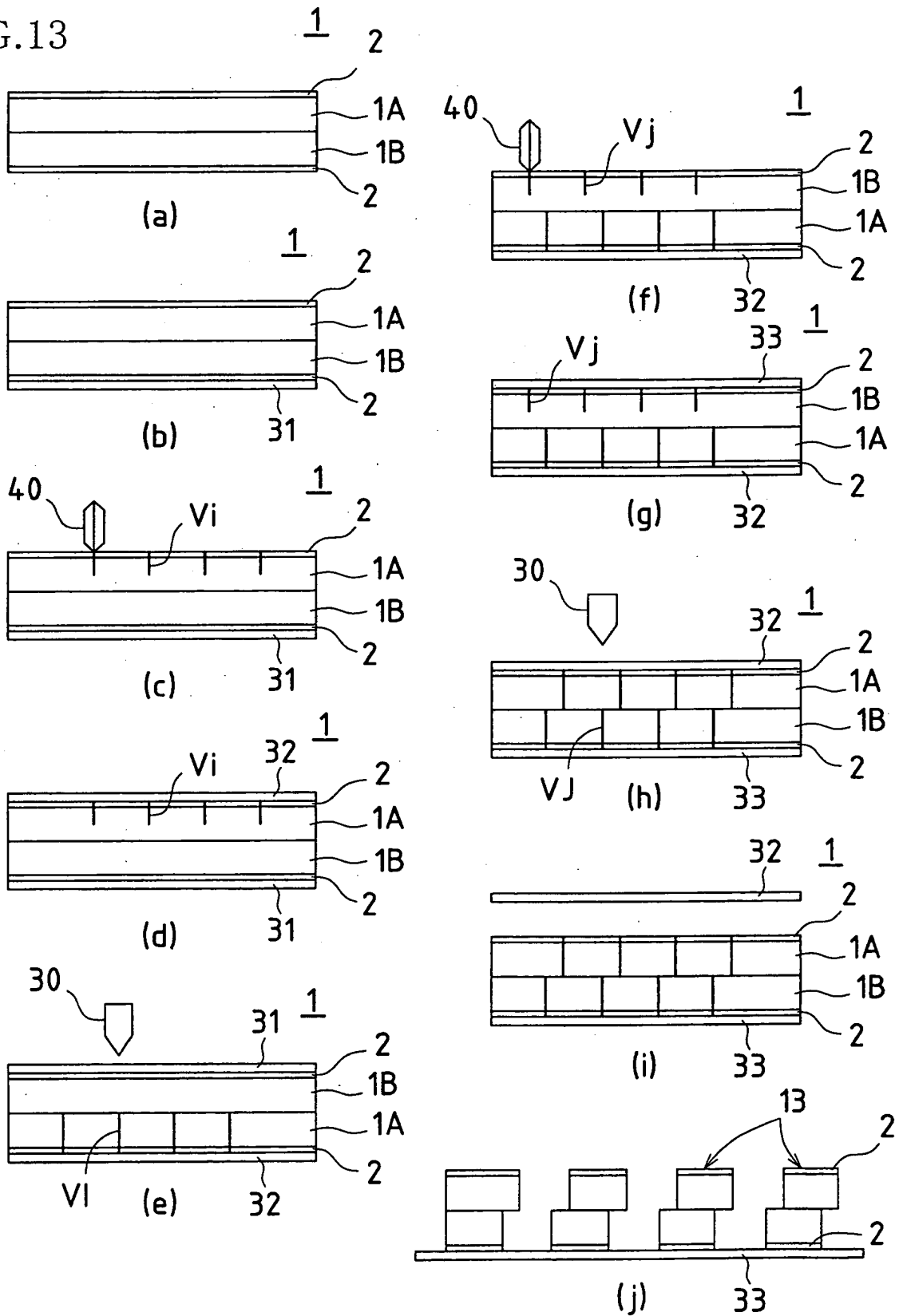
FIG.14

(a)

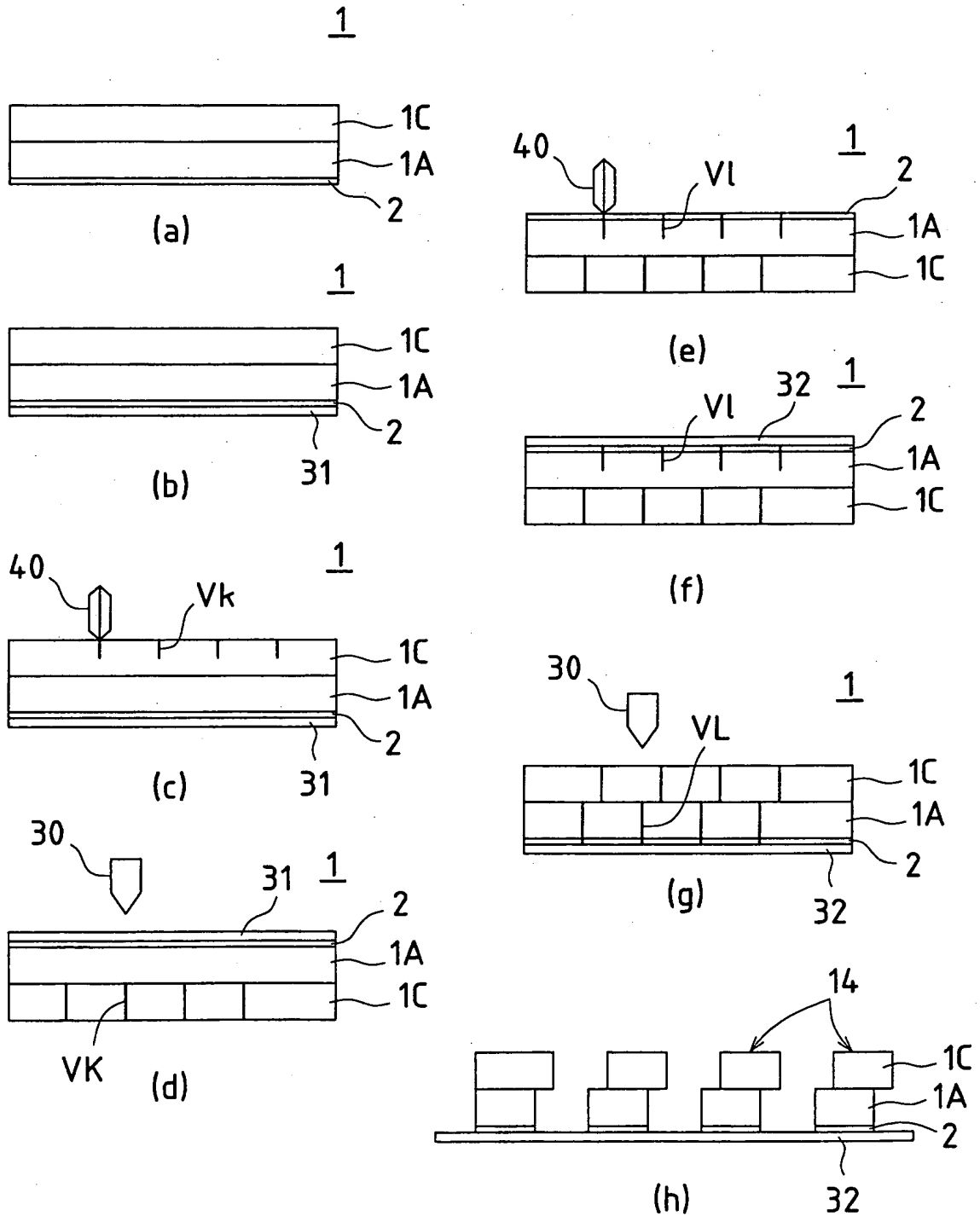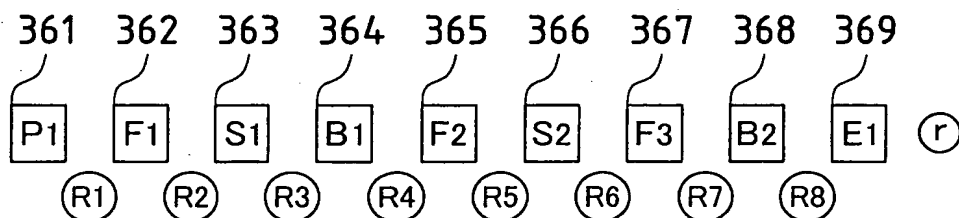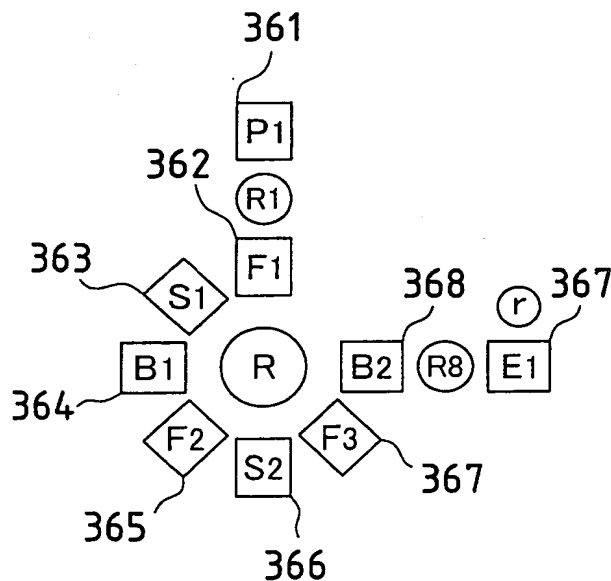|	
P1	: PROTECTIVE MATERIAL PROCESSING DEVICE (341)
R1~R10	: TRANSPORT ROBOTS
F1~F5	: FILM PROCESSING DEVICES (342, 344, 346, 348, 350)
S1·S2	: SCRIBING DEVICES (343, 347)
B1·B2	: BREAKING DEVICES (345, 349)
E1	: SEPARATING DEVICE (351)

341 342 343 344 345 346 347 348 349 350 351

[P1] [F1] [S1] [F2] [B1] [F3] [S2] [F4] [B2] [F5] [E1] (r)

(R1) (R2) (R3) (R4) (R5) (R6) (R7) (R8) (R9) (R10)

(b)

341
[P1]
342   (R1)   350   351
343   [F1]   [F5]   r ◇E1
      [S1]   (R10)
344 [F2]   (R)   [B2]   349
     [B1]   [F4]
345   [F3] [S2]   348
        346   347

FIG.15

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

FIG.16

(a)

P1	:	PROTECTIVE MATERIAL PROCESSING DEVICE (361)
R1~R8	:	TRANSPORT ROBOTS
F1~F3	:	FILM PROCESSING DEVICES (362, 365, 367)
S1·S2	:	SCRIBING DEVICES (363, 366)
B1·B2	:	BREAKING DEVICES (364, 368)
E1	:	SEPARATING DEVICE (369)

361 362 363 364 365 366 367 368 369

P1 F1 S1 B1 F2 S2 F3 B2 E1 (r)

(R1) (R2) (R3) (R4) (R5) (R6) (R7) (R8)

(b)

FIG.17

(a)

(b)

(c)

(d)

(e)
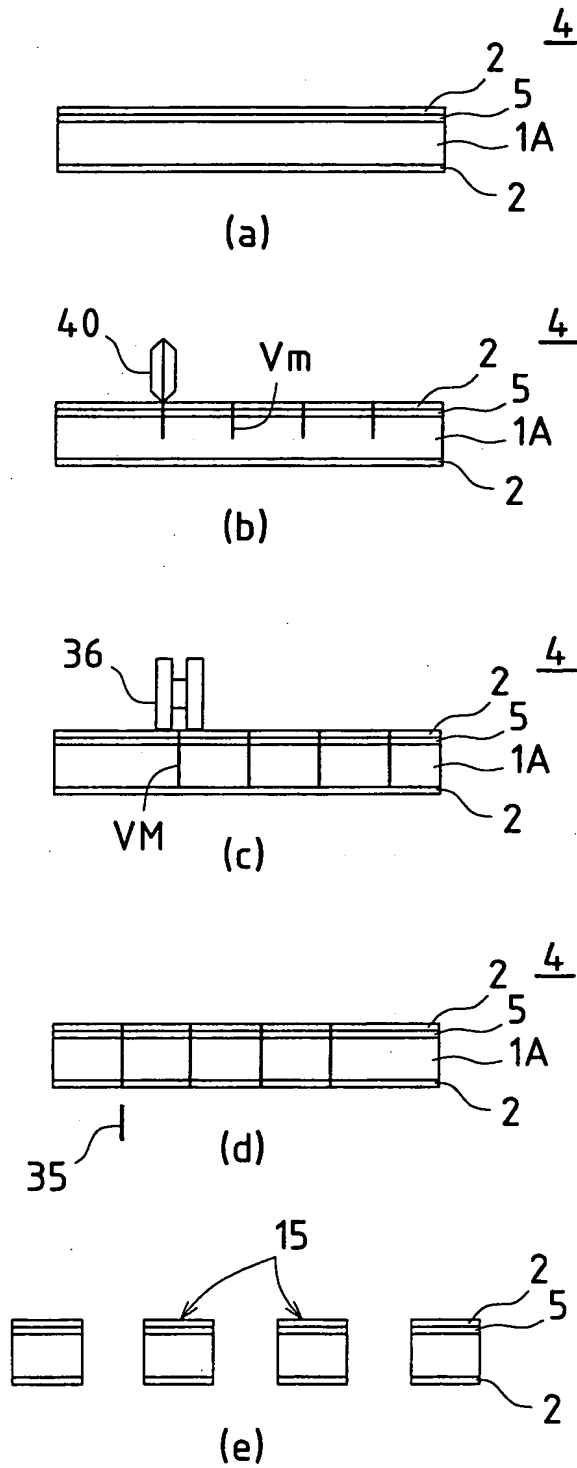
FIG.18

(a)

P1	:	PROTECTIVE MATERIAL PROCESSING DEVICE (381)
R1~R4	:	TRANSPORT ROBOTS
S1	:	SCRIBING DEVICE (382)
B1	:	BREAKING DEVICE (383)
E1	:	SEPARATING DEVICE (385)
C1	:	PROTECTIVE MATERIAL CUTTING DEVICE (384)

381   382   383   384   385

P1   S1   B1   C1   E1   (r)

(R1)   (R2)   (R3)   (R4)

(b)

381

P1

382   (R1)

S1

383   (r)   B1

E1   (R4)   C1   R

385   384

FIG.19

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)
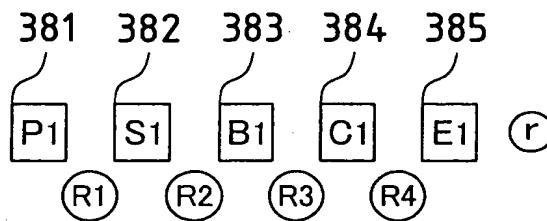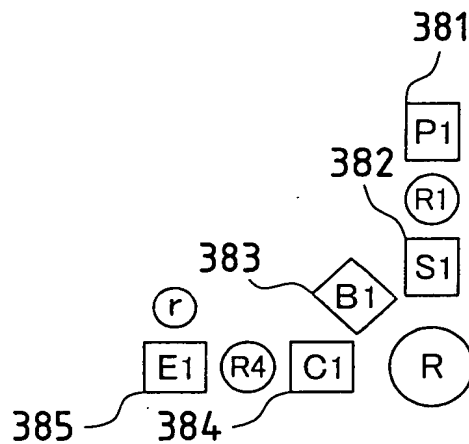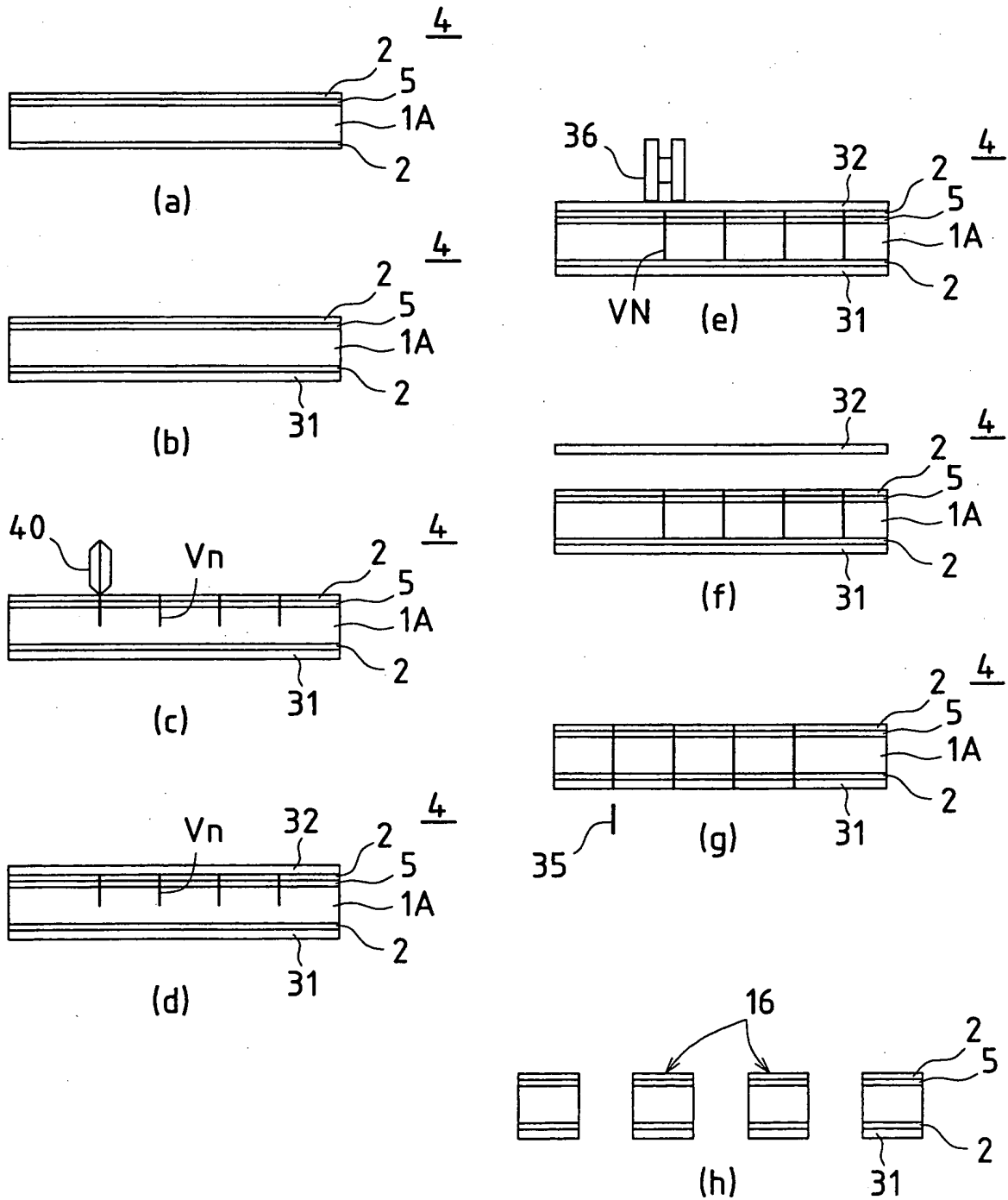
FIG.20

(a)

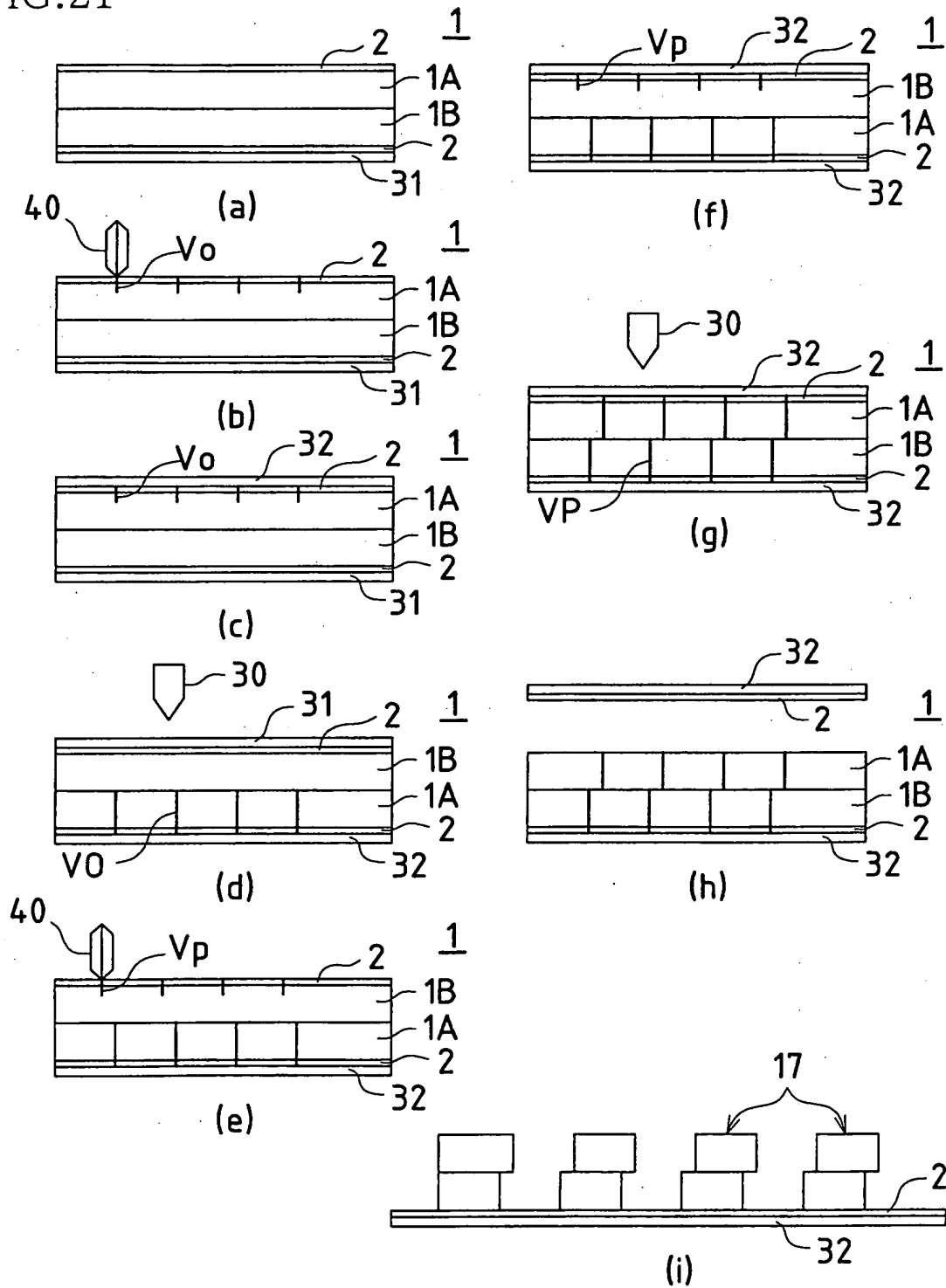| P1	: PROTECTIVE MATERIAL PROCESSING DEVICE (401)
R1〜R7	: TRANSPORT ROBOTS
F1〜F3	: FILM PROCESSING DEVICES (402, 404, 406)
S1	: SCRIBING DEVICE (403)
B1	: BREAKING DEVICE (405)
E1	: SEPARATING DEVICE (408)
C1	: PROTECTIVE MATERIAL CUTTING DEVICE (407)

401 402 403 404 405 406 407 408

P1 F1 S1 F2 B1 F3 C1 E1 (r)

(R1) (R2) (R3) (R4) (R5) (R6) (R7)

(b)

FIG.21

(a)

(b)

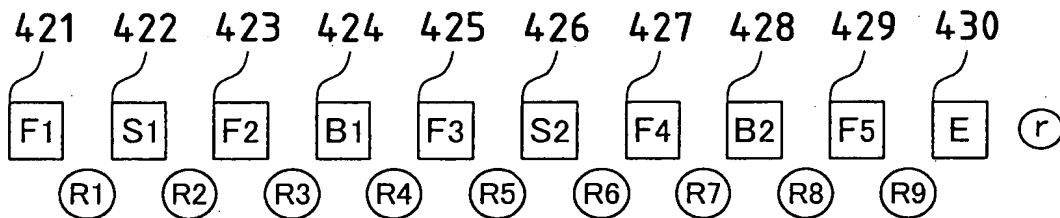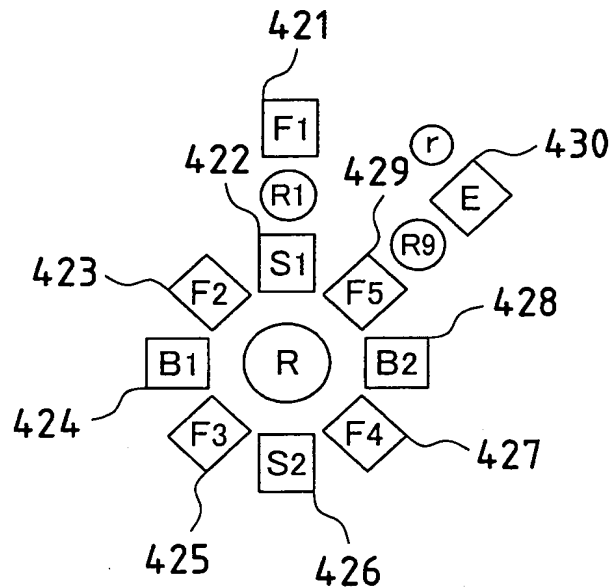(c)

(d)

(e)

(f)

(g)

(h)

(i)
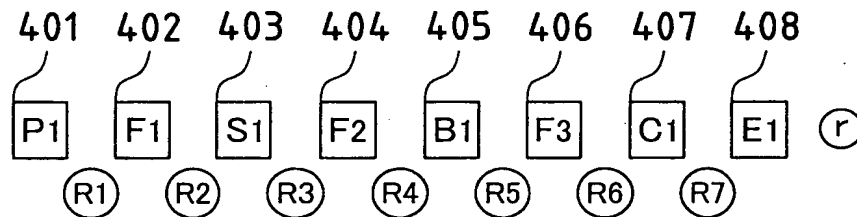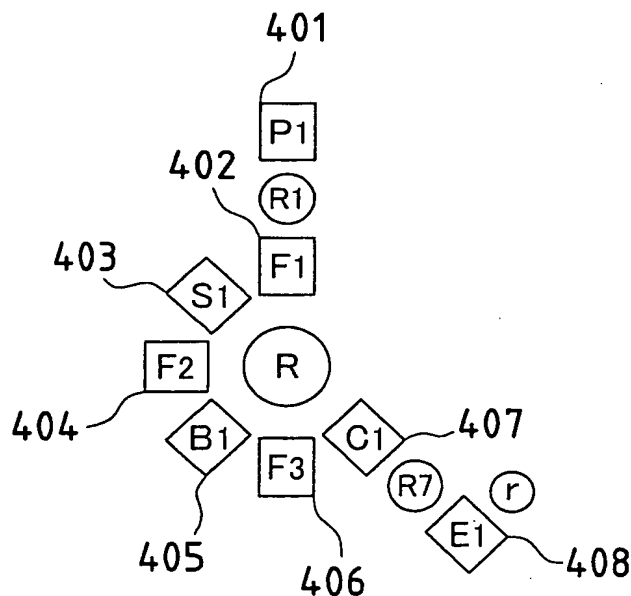
FIG.22

(a)

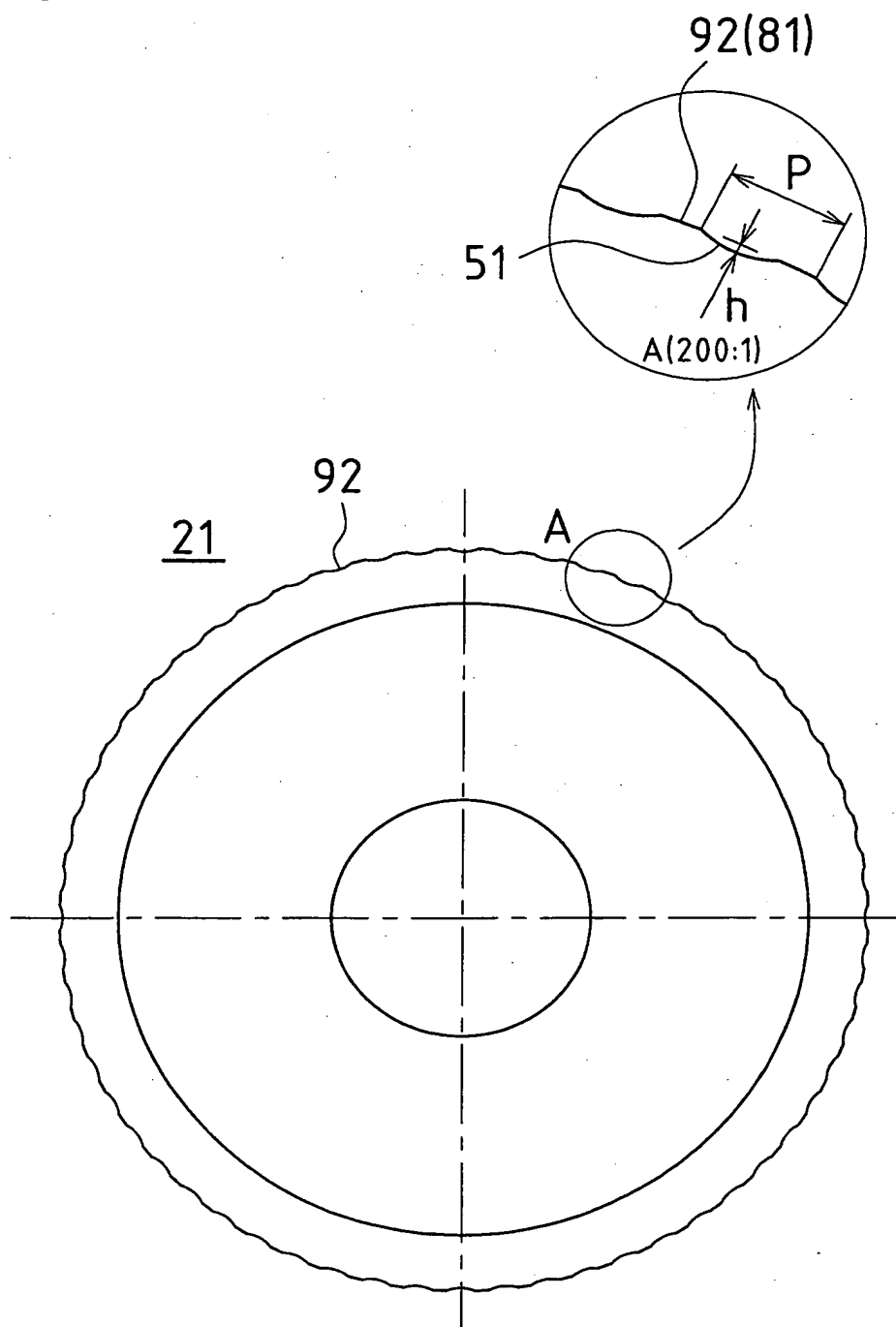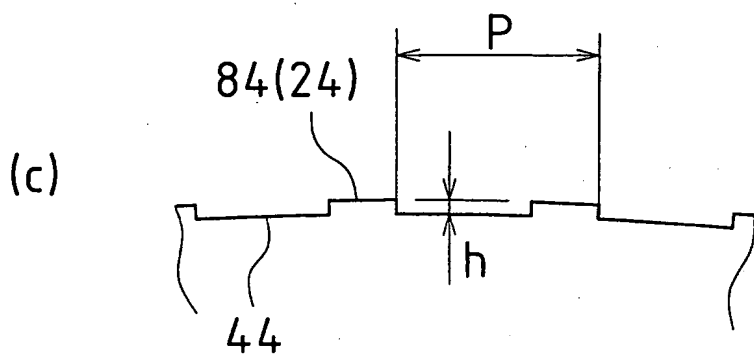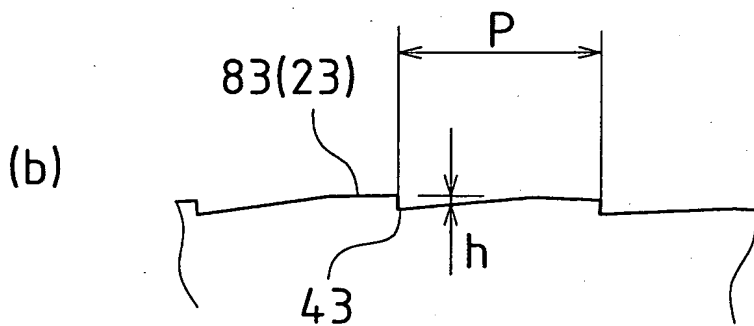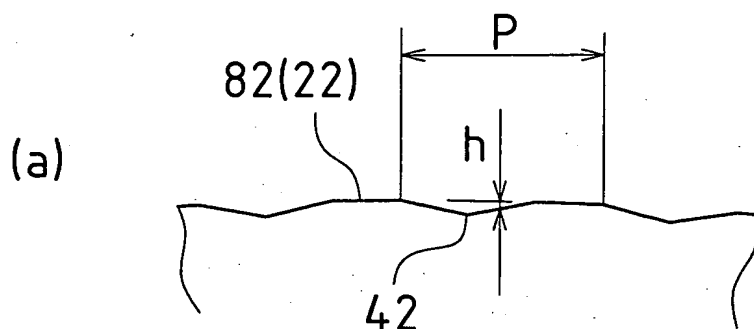| R1~R9 | : TRANSPORT ROBOTS |
F1~F5	: FILM PROCESSING DEVICES (421, 423, 425, 427, 429)
S1·S2	: SCRIBING DEVICES (422, 426)
B1·B2	: BREAKING DEVICES (424, 428)
E	: SEPARATING DEVICE (430)

421 422 423 424 425 426 427 428 429 430

F1 S1 F2 B1 F3 S2 F4 B2 F5 E (r)

(R1) (R2) (R3) (R4) (R5) (R6) (R7) (R8) (R9)

(b)

421

F1

(R1)

422

S1

(r) 430

429 E

(R9)

423 F2

F5

B1 R B2 428

424

F3 S2 F4 427

425 426

FIG.23

FIG.24

(a)

82(22)

P

h

42

(b)

83(23)

P

h

43

(c)

84(24)

P

h

44

FIG.25

40

N
(NO GROOVES)

Y
(WITH GROOVES)

6b

FIG.26

(a)

(b)

FIG.27

133

147

146

132

SERVOMOTOR

132

131

135

138

134   137

136

FIG.28

138

135

134

136   139

137

FIG.29

FIG.30

FIG.31

(a)

(b)

(c)

(d)